Magnetic resonance imaging, X-ray and dual X-ray absorptiometry techniques for assessment and monitoring of knee osteoarthritis

References
1. Insall J: **Current concepts review: patellar pain.** *J Bone Joint Surg Am* 1982, **64:**147-152.
2. Fellows RA, Hill NA, Gill HS, MacIntyre NJ, Harrison MM, Ellis RE, Wilson DR: **Magnetic resonance imaging for *in vivo* assessment of three-dimensional patellar tracking.** *J Biomech*, in press.
3. Katchburian MV, Bull AM, Shih YF, Heatley FW, Amis AA: **Measurement of patellar tracking: assessment and analysis of the literature.** *Clin Orthop* 2003, **412:**241-259.

Acknowledgements Supported by grants from Canadian Institutes of Health Research (CIHR), NSERC, and Physiotherapy Foundation of Canada. Salary support was awarded by The Arthritis Society/CIHR (Research Fellowship, NJM) and the Canadian Arthritis Network (DRW).

101 (P11.2)

Perceived need for workplace accommodation and labour force participation in Canadian adults with arthritis disability

PP Wang, EM Badley, M Gignac

Arthritis Community Research and Evaluation Unit, Department of Public Health Sciences, University of Toronto, Toronto, Ontario, Canada

Arthritis Res Ther 2004, **6(Suppl 3):**101 (DOI 10.1186/ar1436)

Purpose Although reduced labour force participation is often a consequence of physical disability, little is known about the role of workplace accommodation. This study uses a conceptual model based on the World Health Organization International Classification of Functioning, Disability, and Health and hypothesizes perceived need for workplace accommodation as a mediating variable between activity limitation and not in labour force.

Methods Data from the Canadian Health and Activity Limitation Survey were used. Working-age participants (25–64 years) with arthritis disability were included. Employment status was dichotomized into 0 = in labour force (employed and unemployed), 1 = not in labour force. Two latent constructs (lower body and upper body disability) were used to represent 12 categorical physical disability indicators (e.g. difficulty in walking) and one latent construct was derived for eight workplace accommodation indicators (e.g. lack of accessible workstation, elevator or flexible hours if needed). Personal variables (age, sex, education, and occupation) were also incorporated into the model. MPLUS was used to perform the categorical factor analysis and standard error of the mean analyses.

Results Physical activity limitations affected labour force participation both directly and indirectly through perceived need for workplace accommodation. As people's activity limitations became severe they were more likely to perceive the need for workplace accommodation, and in turn, this lead to reduced labour force participation. Lower body activity limitations had more impact on labour force than upper body activity limitation. Older age, female gender, and low education were also associated with reduced labour force participation.

Conclusion Most of the effect of arthritis-associated physical activity limitations and all on labour force participation is mediated by perceived workplace accommodation, which underscores the importance of workplace accommodation provision.

102 (P11.3)

Magnetic resonance imaging, X-ray and dual X-ray absorptiometry techniques for assessment and monitoring of knee osteoarthritis

P Boulos[1,2], D Inglis[2], KA Beattie[2], G Ioannidis[2], CL Gordon[2], J Duryea[3], CE Webber[2,4], JD Adachi[1,2]

[1]Department of Medicine, St Joseph's Healthcare, Hamilton, Ontario, Canada; [2]McMaster University, Hamilton, Ontario, Canada; [3]Department of Radiology, Brigham and Women's Hospital, Harvard University, Boston, Massachusetts, USA; [4]Department of Nuclear Medicine, Hamilton Health Sciences, Hamilton, Ontario, Canada

Arthritis Res Ther 2004, **6(Suppl 3):**102 (DOI 10.1186/ar1437)

Aims Research projects completed and ongoing by members of our research team include: (i) validation of quantitative cartilage measurements using a 1 T extremity magnetic resonance imaging (MRI) scanner; (ii) radiographic evaluation of soft-tissue structures – a comparison between 1 T and 1.5 T MRI scanners; (iii) short-term and long-term reproducibility of computer-determined medial minimum joint space width (mJSW) of the knee using a fixed-flexion X-ray protocol; (iv) determination of 'normal' values of minimum medial joint space width of the knee, bone density using dual X-ray absorptiometry around the knee joint and cartilage volume and thickness in men and women per decade between the ages of 20 and 69 years; (v) determination of values of medial mJSW of the knee, bone density around the knee joint and cartilage volume and thickness in men and women with varying degrees of knee osteoarthritis (OA); (vi) development of a longitudinal database of patients with OA of the knee, documenting pain, physical function, quality of life, history, medication use, family history, physical examination, blood tests, plain film radiographs and MRI of the knee using a 1 T extremity MRI scanner; (vii) development of a more fully automated technique for cartilage segmentation of three-dimensional (3D) MRI data; and (viii) quantification of 3D trabecular bone structure using high-resolution MRI.

Methods Healthy volunteers and patients with knee OA referred for assessment to a rheumatologist are invited to participate in the various studies. All patients are asked to complete preset questionnaires. Radiographs of the knee are performed postero-anteriorly in a standardized fixed-flexion position by trained technicians. Radiographs are subsequently digitized and analyzed for mJSW using an automated computer algorithm. A 1 T extremity MRI scanner is used for imaging each individual's knee. Sequences include a saggital T_1-weighted, 3D spoiled gradient echo with fat saturation, a saggital T_1-weighted fast spin echo (FSE), a coronal T_2-weighted FSE and an axial FSE inversion recovery sequence.

Results Quantitative cartilage measurements of normal and OA subjects' knees were obtained using a validated segmentation technique on both 1 T and 1.5 T MRI images. The 1 T extremity MRI scanner has been found to be reliable and of comparable precision in comparison with a 1.5 T whole-body scanner.

The use of a fixed-flexion position and a computer algorithm to determine medial mJSW of the knee in patients having normal or osteoarthritic knees has been found to be reliable in both short-term and long-term studies. Forty-seven pairs of knee radiographs were assessed in the short-term study while 14 pairs in a long-term study were assessed. Reliability for both studies was measured by means of intraclass correlation coefficient and found to be 0.95–0.99 for both healthy subjects and those with OA.

A cross-sectional study of 45 patients referred for assessment of knee pain is being completed. Data analyses will include comparison of pain scales, history and physical examination with MRI findings in the knee.

Conclusions Quantitative cartilage measurements using a 1 T office-based extremity MRI scanner have been found to be reliable and of comparable precision with those obtained using a 1.5 T whole-body MRI scanner. The use of a fixed-flexion radiographic technique for assessing mJSW has been found to be reliable in a long-term reproducibility study at our center. Early diagnosis and prompt assessments of patients with OA can be accessible using an office-based extremity MRI scanner and could prove to be a valuable clinical tool with the development of disease-modifying agents for the treatment of OA.

Acknowledgements The Arthritis Society and Canadian Institutes of Health Research (PB), and the Canadian Arthritis Network (KAB).